

WHAT IS CLAIMED IS:

1. A spool braking device for a dual bearing reel that brakes a spool that is rotatively mounted on a reel unit, comprising:

an electrically controllable spool braking unit being arranged between the spool  
5 and the reel unit, said electrically controllable spool braking unit being configured to brake the spool;

a tension detection unit being configured to detect tension applied to fishing line released from the spool during casting; and

a spool control unit being configured to control electrically said spool braking unit  
10 such that when the tension detected by said tension detection unit falls below a first predetermined value, the spool is braked with a first constant braking force for a first predetermined time period.

2. The spool braking device for a dual bearing reel according to claim 1,  
15 wherein

said spool braking unit includes,

a plurality of magnets with sequentially different polarities that are aligned  
in a rotational direction,

a plurality of serially connected coils mounted on the reel unit and disposed  
20 around a periphery of said magnets in a circumferential direction,  
said serially connected coils being arranged with gaps therebetween,  
and

a switch unit connected to both ends of said plurality of serially connected  
coils, wherein said spool control unit controls said spool braking  
25 unit by controlling an on/off state of said switch unit.

3. The spool braking device for a dual bearing reel according to claim 1,  
wherein

said first predetermined time period is in a range between 0.1 and 0.5 seconds.  
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4. The spool braking device for a dual bearing reel according to claim 1,  
wherein

said first predetermined value is in a range between 0.5N and 1.5N, and

5. The spool braking device for a dual bearing reel according to claim 2,  
wherein

5 said spool control unit controls an on/off state of said switch unit by pulse width  
modification control.

6. The spool braking device for a dual bearing reel according to claim 2,  
wherein

10 when said spool control unit controls said on/off state of said switch unit at a 50 to  
100% duty ratio, the spool is configured to be braked with said first braking force by said  
spool braking unit.

7. The spool braking device for a dual bearing reel according to claim 1,  
15 wherein

said tension detection unit includes,

a speed detection unit that optically detects a rotational speed of the spool,  
and

20 a torque computation unit that computes a drive torque that rotates the  
spool by a rate of change of the rotational speed detected by said  
speed detection unit and a moment of inertia of the spool, and  
said tension is detected by a computed drive torque.

8. The spool braking device for a dual bearing reel according to claim 1,  
25 wherein

after said first predetermined time period, said spool control unit controls said  
spool braking unit to brake the spool for a second predetermined time period with a second  
braking force that is weaker than the first braking force and is configured to become  
weaker.

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9. The spool braking device for a dual bearing reel according to claim 7,  
wherein

said spool control unit determines the first braking force based on the rotational speed of the spool detected by said speed detection unit.

10. The spool braking device for a dual bearing reel according to claim 8,  
5 wherein

said tension detection unit includes a speed detection unit that optically detects a rotational speed of the spool, and

said spool control unit determines the second predetermined time period based on the rotational speed of the spool detected by said speed detection unit.

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11. The spool braking device for a dual bearing reel according to claim 8,  
wherein

said second predetermined time period is in a range between 0.3 and 2 seconds.

12. The spool braking device for a dual bearing reel according to claim 1,  
15 further comprising,

pattern memory means having a plurality of control patterns stored therein, each of said plurality of control patterns being different at least in one of said first braking force, said first predetermined value, and said first predetermined time period, and

20 pattern selection means that selects one control pattern from said plurality of control patterns stored in said pattern memory unit,

wherein said spool control unit controls said spool braking unit based on said control pattern selected by said pattern selection means.

13. The spool braking device for a dual bearing reel according to claim 8,  
25 further comprising,

tension pattern setting means that sets a tension pattern, based on which the second braking force is determined,

30 wherein said spool control unit corrects said second braking force in response to said tension pattern while said spool control unit controls said spool braking unit during said second predetermined time period with said second braking force.

14. The spool braking device for a dual bearing reel according to claim 8, further comprising,

first braking pattern setting means that sets at least one first braking pattern that indicates at least said first braking force, and

5 second braking pattern setting means that sets at least one second braking pattern that indicates at least said second braking force that is smaller than said first braking force of said first braking pattern,

wherein said spool control unit that electrically controls said spool braking unit so that the spool is braked with said at least one first braking pattern when the spool  
10 rotational speed is equal to or greater than a predetermined value and with said at least one second braking pattern when said spool rotational speed is below the predetermined value.

15. The spool braking device for a dual bearing reel according to claim 14, wherein

15 said first braking pattern setting means includes,

first pattern storage means in which at least one first braking pattern is stored, and

first pattern read-out means that reads out said at least one first braking pattern.

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16. The spool braking device for a dual bearing reel according to claim 15, wherein,

said first pattern storage means has stored therein a plurality of first braking patterns that correspond to different braking forces, and

25 said first braking pattern setting means further includes pattern selection means that selects any of said plurality of first braking patterns stored in said first pattern storage unit,

wherein said first pattern read-out means reads out a selected first braking pattern from said first pattern storage means.

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17. The spool braking device according to claim 14, wherein

one of said plurality of first braking patterns stored in said first pattern storage means is a reference braking pattern,

said spool braking device further comprises a first braking pattern setting means that includes

5 first braking pattern computation means that computes a plurality of different first braking patterns that have different braking force from that of said reference braking pattern, and

pattern selection means that selects a first braking pattern from said reference braking pattern and said plurality of first braking patterns  
10 that were computed,

said first braking pattern setting means sets a first braking pattern that said pattern selection unit selected from said reference braking pattern and said computed first braking patterns stored in said first braking pattern storage means.

15 18. The spool braking device for a dual bearing reel according to claim 17, wherein

said first braking pattern computation means computes said plurality of first braking patterns such that said plurality of first braking patterns have braking forces that are smaller than the braking force of the reference braking pattern.

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19. The spool braking device for a dual bearing reel according to claim 14, wherein

said second braking pattern setting means includes,

25 second pattern storage means in which said at least one second braking pattern is stored, and

second pattern read-out means that reads out at least one second braking pattern stored in said second pattern storage means.

30 20. The spool braking device for a dual bearing reel according to claim 14, wherein

said second braking pattern setting means computes and sets said second braking pattern based on said first braking pattern.